DOCUMENT RESUME

ED 422 476 CE 076 994

AUTHOR	Bernhardt, Annette; Morris, Martina; Handcock, Mark; Scott, Marc
TITLE	Inequality and Mobility: Trends in Wage Growth for Young Adults. IEE Working Paper No. 7.
INSTITUTION	Columbia Univ., New York, NY. Inst. on Education and the Economy.
SPONS AGENCY	Rockefeller Foundation, New York, NY.; Russell Sage Foundation, New York, NY.
PUB DATE	1998-07-00
NOTE	50p.; For related documents, see CE 076 499 and CE 076 993-995.
PUB TYPE	Reports - Research (143)
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	Adult Education; Comparative Analysis; *Economic Factors; Employment Patterns; Employment Practices; Employment Problems; Equal Opportunities (Jobs); *Males; *Occupational Mobility; Personnel Policy; Salaries; *Salary Wage Differentials; Socioeconomic Status; *Wages; *Whites; Young Adults
IDENTIFIERS	National Longitudinal Survey of Youth; National Longitudinal Survey Youth Labor Market Ex

ABSTRACT

To examine the impact of rising wage inequality on lifetime wage growth, a study compared the wage mobility experienced by two cohorts of young white men from the National Longitudinal Surveys. The original cohort entered the labor market in the mid-1960s at the end of the economic boom and was followed through the end of the 1970s. The recent cohort entered the labor market in the early 1980s after the onset of economic restructuring and was followed through the mid-1990s. For each cohort, wage profiles were analyzed across 16 years using a mixed-effects model. Analysis indicated that wage growth during the critical years of career development had been hit on two fronts: it had both stagnated and become significantly more unequal. To the extent that wage growth represented upward mobility, the prospects for such mobility had clearly deteriorated in recent years. (Appendixes contain 48 references, 3 data tables, and 8 figures.) (YLB)

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Institute on Education and the Economy

Inequality and Mobility: Trends in Wage Growth for Young Adults

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IEE Working Paper No. 7
July 1998

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Trends in Wage Growth for Young Adults

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ABSTRACT

After two decades of rising wage inequality, it is important to examine the impact of these changes on lifetime wage growth. This paper compares the intragenerational mobility of two NLS cohorts of young white men: the first entered the labor market in the late 1960s, the second in the early 1980s. For each cohort, we analyze wage profiles across 16 years using a mixed-effects model. We find that long-term wage growth has both stagnated and become more unequal in recent years. Changes in the composition of and returns to education, experience, occupation and other covariates explain about half the rise in inequality, leaving a significant residual. Our findings suggest a decline in the economic welfare of workers who entered the labor market in the 1980s.

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INTRODUCTION

After two decades of rising wage inequality, researchers are beginning to document the emergence of deeper changes in what it means to have a job and to build a career. The recovery of the 1990s did not prove the cure-all that other recoveries have in the past, even with the current tight labor market. Youth are more pessimistic than ever about their chances for upward mobility and education no longer seems to guarantee a stable career. Workplaces are being reorganized in ways that are not always in the interest of employees, and it seems that downsizing and flexible staffing have become something of a fixture in the post-industrial landscape. Compared to the post-war period, the American employment relationship appears to be changing – in how the workplace is organized, in how workers are matched with jobs, and in how wages and the terms of employment are set (Cappelli, et al. 1997).

These changes have potentially strong implications for the patterns of mobility that workers experience over their lifetime. Under the traditional mass production system, workers could expect annual raises and some measure of job security, even if they never moved beyond the shop floor. In return, employers obtained control over labor supply and a committed workforce, or at least a fragile truce with labor (Kochan, Katz and McKersie 1986). They also got a customized training system: workers brought firm-specific knowledge and skills to each new position up the ladder. This internal labor market had its benefits but also incurred a set of costs. Employers could not easily hire from the outside, change the number of hours worked, or alter wages and benefits (Hyman 1988).

The terms of this trade-off have apparently deteriorated for American employers. Starting in the mid-70s, cost became an overriding basis of competition, and certain features of internal labor markets became a natural target for cost reduction. Permanent workers with long

tenures need to be paid high wages and expensive benefits, even when they sit idle during slack demand. With a rapidly changing technological environment, skills quickly become obsolete and retraining is expensive. In the search for flexibility, some firms have chosen to adopt so-called "high-performance" work systems that benefit employees as well as raise productivity. Other firms, however, are now more willing to forego the motivation and specific knowledge of long-term employees, moving instead toward flexible staffing, outsourcing and subcontracting, reduced training and external hiring for skilled workers. Many firms combine elements of both strategies (Harrison 1994; Osterman 1994; Pfeffer and Baron 1988; Cappelli 1995).

From one perspective, this is good news. Productivity growth has increased in many industries, with an attendant boost in profits. Workplaces have become more efficient, technological innovation is brisk, and American global competitiveness has clearly been restored. From another perspective, however, the news may not be so good. There is a growing sense among the public that individuals' life chances are becoming more unequal (Frank and Cook 1995). For significant numbers of workers, employment is being weaned from internal labor markets, and this affects not only their current jobs but also their long term career prospects. What happens to promotions, raises, and "climbing up the ladder" when workers move from one employer to the next, and when the employers may be increasingly reluctant to invest in on-the-job training? The traditional routes to upward mobility break down. It is likely that skilled workers in professional occupations can create new career paths which preserve their opportunities. But for occupations further down the ladder – more numerous in absolute terms –

the consequence may well be declining opportunities for upward mobility and career development.[1]

While the recent trends in inequality have generated a prodigious amount of literature, little of it has examined the issue of mobility. Labor economists have largely restricted their focus to analyzing the determinants of the cross-sectional rise in inequality and sociologists have generally focused on the differential impacts observed by race, sex, and region. There is an established body of research which documents the unprecedented rise in wage inequality, declining wages for low-skill workers, and marked deterioration in economic welfare for parts of the African American and Hispanic populations (Bradbury, Kodrzycki and Mayer, 1996; Danziger and Gottschalk 1993; Levy and Murnane 1992; Mishel, Bernstein and Schmitt 1997). Beyond these aggregate cross-sectional trends, however, the picture is less clear. The growth in cross-sectional inequality that we have observed is equally consistent with a scenario in which young workers start in low-wage jobs and move to high-wage jobs by adulthood, or a scenario in which some workers get stuck in a cycle of low-wage jobs while others experience dramatic wage growth over their career.

Mobility remains the key to a sociological perspective on inequality. For mobility is where the link between labor market structure and individual life history is made, where we gain insight into the dynamic processes that actually generate inequality, and where we assess how well America is meeting its meritocratic ideal. To a large extent, however, mobility has come to be used only as an intergenerational concept in sociological research, and the process of mobility over the lifecourse has been neglected (but see DiPrete and McManus 1996; Podolny and Baron

[1] The top ten occupations with the largest projected job growth between 1996 and 2006 are cashiers, systems analysts, general managers, registered nurses, retail salespersons, truck drivers, home health aides, teacher aides, nursing aides and orderlies, receptionists and information clerks (U.S. Department of Labor 1998).

1997). This was not always the case. Intragenerational mobility was a critical element in much of the original theoretical work on dual labor markets (cf., Wallace and Kalleberg, 1981 for a review). At root, what distinguished the dual segments was the absence or presence of internal labor markets, and this concept was inherently tied to the mobility process. The analysis of inequality in the past decade has lost much of this focus.

As the link between firm restructuring and wage inequality begins to be made, however, it is natural that we return to individuals' work histories in order to analyze the dynamics of this new labor market. Current research has therefore begun to focus on analyzing longitudinal datasets, taking up such questions as whether wage growth has deteriorated, whether the rate of job changing has increased, and how each of these processes unfolds over the life course (e.g., Gottschalk 1997; Neumark, Polsky, and Hansen 1997; Duncan, Boisjoly, and Smeeding 1996; Gittleman and Joyce 1996). Mobility is again at the center of analysis.

Our study falls squarely into this emerging field. We compare the wage mobility experienced by two cohorts of young white men from the National Longitudinal Surveys. The original cohort entered the labor market in the mid 1960s at the tail of the economic boom, and was followed through the end of the 70s. The recent cohort entered the labor market in the early 1980s after the onset of economic restructuring, and was followed through the mid 90s. Comparing the progress of the two cohorts enables us to isolate the impact of differences in economic context on the patterns of economic mobility. Specifically, we ask two questions about wage mobility for these young adults. First, has the amount of upward mobility changed, on average, for the recent cohort as compared to the original cohort? Second, has upward mobility become more unequal in the recent cohort, reflecting a growing divergence in their life chances? Two aspects of economic well-being are being captured here, one absolute and the

other relative. A change in average mobility indicates that everyone's boat is either rising or falling. Growing inequality in mobility means that some worker's boats are rising whereas others' boats are falling. When both absolute and relative mobility deteriorate at the same time, the effects on those with modest opportunity can be devastating.

Our logic is that if indeed a new labor market structure is emerging in this country, then the recent cohort of young adults has been the first to experience it in full strength – and the impact should be observable in their work histories and wage trajectories. While this is clearly an indirect test of the link between firm restructuring and mobility (we have no measures of the firms that employ these workers), it is a direct test of whether the nature of career mobility has changed. Because we are tracking both cohorts during the period when they experience the majority of their life-time wage growth, the changes we identify will have strong implications for the long term distribution of economic welfare.

DATA

We compare two datasets from the National Longitudinal Surveys. The first is the National Longitudinal Survey of Young Men: a representative sample of young men was interviewed in 1966 and tracked until 1981, reinterviewed yearly in that time span except for 1972, 1974, 1977, and 1979. The second is the male sample of the National Longitudinal Survey of Youth: a representative sample of young men was interviewed in 1979 and has been interviewed yearly since then, with 1994 the most recent available year. Throughout, we refer to the former as the "original cohort" and to the latter as the "recent cohort." Rich and detailed information was gathered on schooling, work history, and job characteristics for both cohorts throughout the years of observation. The initial baseline sample selection for both cohorts is as

follows. We selected non-Hispanic whites only, because attrition among non-whites was extreme in the original cohort. We also dropped the poor white supplemental sample and the military supplemental sample from the recent cohort. The final sample sizes are 2,743 for the original cohort and 2,427 for the recent cohort.

It is important to stress that the NLS data are not representative of the entire population over time, unlike the other main longitudinal dataset, the PSID. Instead, the NLS data comprise a representative sample of a moving 8-year age window: from the ages of 14-21 at the beginning of the panel to the ages of 30-37 at the end. The strength of this research design lies in the fact that we observe both cohorts across a critical 16-year time span. It is during this period that they make the transition to the labor force, lay the groundwork for an eventual long-term relationship with an employer, and experience the majority of their lifetime wage growth.

There are few previous studies that compare these two datasets, so we have conducted a series of analyses to establish the representativeness and comparability of the samples and the impact of differential attrition bias. We found no problems with the representativeness and comparability of the initial starting-year samples of the two cohorts. The starting age distributions differ slightly, so we control for age in all analyses. While the pattern of missed interviews during the survey span differs between the two cohorts, detailed recovery of data has minimized bias on that account (details can be found in Bernhardt, et al. 1997). We also investigated a potential problem that had been noted in previous research concerning wage dispersion trends in the recent cohort (Gottschalk and Moffit 1997), and were able to document the validity of the NLSY data.

One of the best known characteristics of the original cohort data is that about one third of the respondents served in the Vietnam War at some point during the survey years. Surprisingly,

the timing and rate of attrition is similar for veterans and non-veterans: a majority of the veterans returned to the survey after their military service, behaving much like the general population in terms of attrition after their return. Of course the veterans lost several years of experience in the civilian labor market during their years of military service. They therefore show a clear time lag in their entry into the labor market, with shorter tenures and less accumulated work experience by their early 30s. We adjust for this in the analyses below. Beyond this time lag, however, we found no significant bias on other dimensions (e.g. employment rates, hourly wages, occupation). It appears that the veterans were able to make up most, if not all, of the lost ground, a finding consistent with other research (Berger and Hirsch 1983).

The attrition rate is considerably higher for the original cohort than for the recent cohort (25.8% vs. 7.8%). There is consensus that attrition has not compromised the representativeness of the recent cohort, but findings for the original cohort are mixed (O'Neill 1982; Rhoton 1984; Falaris and Peters 1998). NLS revised the original base-year weights in each subsequent survey year to account for permanent attrition and non-response within any given year, and we use these weights throughout. However, these adjustments were only intended to compensate for potential non-response bias along the main sampling dimensions (race, geographic residence, family income), not along the outcome dimension that is the focus of this paper. We therefore investigated the extent to which the differential attrition rates between the two cohorts might have affected the cohort differences that we observe. We found that controlling for age and education removes any attrition bias in wages (as is true with other key variables such as employment status, labor force participation, tenure, and work experience). We therefore control for age and education in all final models.

We use wage growth as our primary dependent variable, because it is the most fundamental measure of mobility. When Americans talk of upward mobility, they are implicitly referencing successful career development that results in the attainment of a high income. While other indicators of mobility, such as reaching a professional occupation or completing a college degree, may also be a part of the picture, these status markers would have less meaning in the absence of the greater income they command.

To construct our measure of wage growth, we use hourly wages of the respondent's main CPS job. We restrict the sample to ages 16 and older, and use all available years from each cohort.[2] We have chosen to focus on hourly wages rather than yearly earnings because the latter are confounded by hours and weeks worked and the number of jobs held during the year. The former allows us to more closely approximate the market distribution of wage offers, and by extension, the opportunities available to different groups in the labor force. Analyses are based on logged real wages in 1992 dollars, using the Personal Consumption Expenditure deflator. Table 1 gives summary statistics for the resulting sample.

In both cohorts, roughly 5% of the wages required imputation either due to invalid skips or censoring by NLS. Our imputation scheme used a contextual stratification of the wage profile (i.e. whether the missing wage was at the beginning, middle or end of a sequence) and a regression model based on nearby wages, age, and current education level (Rubin 1987, p. 258). The imputed wages retain both the level and the variability of the wages in each context. The wages have also been cleaned, with extremely low wages (below one-quarter of the minimum wage) and extremely high wages (cross-sectional outliers with longitudinal inconsistency)

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[2] Because the original cohort was not interviewed in four years over the 16-year survey period, they have fewer observations than the recent cohort. The data from the recent cohort can be made perfectly comparable by throwing out the analogous years, but this clearly imposes a loss of information. We have run all of the models

removed from the analyses. This amounts to the removal of less than 1% of the wage observations for both cohorts.

Several alternative measures are commonly used to track wages over time in longitudinal wage studies: age, experience, and calendar year. In this paper we use age as the reference dimension along which wages change. Age is invariant to individual differences in labor supply and educational choices (as compared to work experience) and also smooths business cycle effects (as compared to calendar year), since age observations are pooled across multiple survey years. This strategy allows us to initially compare the two cohorts on a standard dimension, and then to introduce the effects of differences in experience, education, and other factors.

BASIC TRENDS IN WAGES

Figure 1 shows the cross-sectional patterns now well known to researchers. Compared to the original cohort, wages have stagnated for the recent cohort at the same time that the variance in wages has increased. These differences are quite pronounced: by the mid-30s, average wages are 8% lower, and the variance of wage at least 50% higher, for the recent cohort.[3] Similarly, breakdowns of these aggregate trends by education (not shown here) tell the established story that the relative returns to education have changed for the recent cohort: while median real wages have remained fairly constant for the college educated, they have fallen substantially for the less educated. The increase in variance, however, is evident across all education groups.

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presented here with samples restricted to the perfectly matched years, and the results do not differ significantly from the full data set.

[3] There are several reasons for the cross-over at age 21 in the variance graph: (1) cohort differences in the amount of wage heaping in the early age ranges, which tends to be large, and (2) cohort differences in the timing of full-time entry into the labor market.

The story becomes even more interesting when we take a closer look at exactly how the wages of the recent cohort have become more dispersed. Drawing on methods developed in Handcock and Morris (1998), Figure 2 plots the relative distribution of wages for 35-37 year olds to the wages for 16-18 year olds. Within each cohort, the cross-sectional distributions have been median-matched in order to isolate changes in the shape of the wage distributions. Effectively, we start with the wage distribution for 16-18 year olds, then at each percentile we ask what fraction of the wages of 35-37 year olds fell at that level, net of median growth. Comparing across the two panels allows us to ask whether the dispersion in wages over age differs between the two cohorts.

The overall story from the two graphs is clear. As young workers pursue their careers and begin to form long-term attachments to employers, their wages become progressively more dispersed and polarized. This should come as no surprise. By their mid-30s, young workers increasingly have different amounts of education, skill, and experience and are settling into industries and occupations that carry different wage premia.

The important message, though, is the striking contrast between the two graphs. Compared to the original cohort, the growth in polarization is markedly stronger for the recent cohort. By the time the young workers reach their mid-30s, the density of low wages has grown three-fold for the recent cohort, but only by 20% for the recent cohort. Similarly for the density of high wages at the top of the distribution. As a result, there is a much steeper drop in the density of middle-range wages for the recent cohort.

MODELING WAGE PROFILES

In short, we have cross-sectional evidence that young workers in recent years have seen a marked stagnation in wages and an equally marked polarization in wages. This potentially signals a deterioration in absolute and relative mobility among young workers, and the impact on long-term career mobility could be profound.

A conclusive statement, however, requires that we shift to an analysis of longitudinal wage profiles. Each individual worker builds his own distinctive wage trajectory as he grows older. Some of those trajectories are steep, with substantial wage increases each year, and others are flat, with little wage growth over time. It is these wage trajectories, or profiles, that capture the essence of upward mobility. As such if we want to make statements about what has happened to the mobility paths of young workers in recent years, we must base our analysis on these profiles. For example, it could be that during the 80s and 90s, short-term fluctuations in wages have become more prevalent as the labor market has become more volatile. This is the argument made by Gottshalk and Moffitt (1994), Moffit and Gottschalk (1995), and Stevens (1996a).[4] Worker's wages in the recent cohort might show more variability from one year to the next, but the overall path of their wage trajectory would otherwise remain unchanged. This scenario could account for the greater wage polarization in the above graphs, without indicating any greater inequality in the life chances of the young workers.[5]

Alternatively, it could be that the long-run, permanent growth in wages has, in fact, become more polarized and unequal in recent years – that there are more workers with steep wage trajectories, more workers with flat wage trajectories, and correspondingly fewer with mid-

[4] For more general research on changes in income mobility in the United States, see Gittleman and Joyce (1997), Sawhill and McMurrer (1997), and Buchinsky and Hunt (1998).

level wage growth. Initial evidence along these lines is given in Duncan, Boisjoly and Smeeding (1996) and Haider (1997). This scenario is much more troubling. The trajectories that we are measuring for the two cohorts cover as much as the first 16 years of wage growth, and we know that over two-thirds of life-time wage gains are made during this period (Murphy and Welch 1990). Thus we are effectively seeing most of the mobility that these young workers will experience during their career. If we find greater inequality in permanent wage growth during this period, we are effectively documenting a lifetime of growing inequality for these young adults.

Evidence for these two scenarios can be found by comparing the wage-growth trajectories between the two cohorts and asking whether these trajectories have become more unequal in recent years, net of any short-term variability in wage growth. The model we will be using employs a set of fixed effects to capture the average curve of the wage profile, a set of random effects to isolate the heterogeneity in permanent wage gains among individuals, and a residual term to represent the transitory components of wage change within each individual profile.

The permanent and transitory components of wage-profile heterogeneity are specified as follows:[6]

$$y_{it} = \beta_0 + \beta_1 l_{it} + \beta_2 q_{it} + e_{it},$$

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[5] This is not to downplay the significant effect that year-to-year wage variability can have on economic security.

[6] We do not consider random walk models here. A comparison of random walk and mixed-effects regression models is given in Baker (1995) and Haider (1997).

where y_{it} is the log of the real wage of individual i in year t, l_{it} and q_{it} are the linear and quadratic age terms respectively[7], and β_o, β_1, and β_2 are the fixed-effect parameters.

The fixed-effect quadratic in age is used to capture the average wage profile. The random effects component is then specified as:

$$e_{it} = p_{it} + u_{it},$$

where we define p_{it} as the permanent component and u_{it} as the transitory component. Specifically,

$$p_{it} = b_{0i} + b_{1i}\, l_{it} + b_{2i}\, q_{it}.$$

Thus p_{it} is a random quadratic representing the deviation of the individual-specific wage profile from the average wage profile. Under this parameterization, b_{0i}, b_{1i}, and b_{2i} represent the deviations from their fixed-effects counterparts.[8] While it is possible to model the residual dependence in the transitory component, u_{it}, for example by using an ARMA(p,q) process, we will assume here that this component is independent between and within individual profiles.[9]

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[7] We have parameterized l_{it} as the age of individual i in year t centered on age 16 and q_{it} as the quadratic term centered on age 16 and orthogonal to l_{it}. Under this parameterization, β_o can be interpreted as the mean log-wage at age16, β_1 as the mean rate of change of log-wages at age 16, and β_2 as the mean percentage change in wage growth at age 16.

[8] We model b_{0i}, b_{1i} and b_{2i} as samples from a mean-zero trivariate Gaussian distribution.

[9] We considered a model that included ARMA(1,0) errors. The lag one correlation for the autoregressive model is between .35 & .40, and our raw data shows a first-order autocorrelation of around .58 (if one regresses log wages on a lagged version of log wages). While we don't believe that the errors are purely independent, the addition of an ARMA(1,0) component does not change our substantive interpretations.

We suppose u_{it} is mean-zero and allow the variance of u_{it} to vary by calendar year to capture any business cycle effects.[10]

Other studies have specified the permanent and transitory effects in different ways. Gottshalk and Moffitt (1994) build less structure into the permanent component, allowing a random effect only for the age intercept. This forces all systematic profile heterogeneity into the transitory component and tends to overestimate wage instability. Several recent papers introduce an additional structure to the permanent component. The added structure can either take the form of changes over time in the returns to specific covariates (Katz 1994), or profile heterogeneity (Haider 1997; Baker 1995; Moffit and Gottschalk 1995). Clearly, the relative magnitudes of the transitory and permanent components will vary under different specifications. For the question we are trying to answer, the systematic heterogeneity in individual wage profiles is of direct substantive interest, hence we define the permanent component of wage growth at the individual level.

Figure 3 gives a schematic illustration of the model being estimated. Panel A shows, on average, what a wage trajectory looks like. Wages start out low when the worker is young, then rise steeply during the pivotal ages of job search, when work experience is gained and skills are honed, and then eventually reach a plateau. In later years, the worker typically holds a long-term job with one employer, and wages grow incrementally via small but consistent yearly increases.

In terms of our model, this trajectory is the *average* trajectory across all workers, and it is estimated with the fixed-effects parameters. In order to approximate the curvature of this

[10] The parameters in our model are estimated using restricted maximum likelihood (REML). In addition to being asymptotically efficient under the assumption of Gaussianality, this approach provides asymptotic standard errors and covariances for the fixed and random parameter estimates.

average profile, we estimate a quadratic in age.[11] This allows us to identify the initial starting wage level (the intercept), the slope upward (the linear age term), and the eventual plateauing in the older age ranges (the squared age term).

In Panel B, we allow different workers to have different long-run trajectories: some are higher and steeper, others are lower and flatter. These differences become more pronounced as young workers differentiate themselves in the labor market. It is the *variation* in these trajectories that is the key question for us: specifically, whether the dispersion of the individual profiles has become more pronounced and significant in recent years. Because these profiles represent the permanent and long-run trajectory of individual workers' wage growth, we call the total variation across these profiles the "permanent variance."

Finally, in Panel C, short-term fluctuations around the long-run wage trajectories are added. Reasons for such fluctuations include job changes, business cycle effects, school enrollment, and so forth. Because any *systematic* gains or losses from these effects are eventually captured in the permanent wage profiles, we call this residual variation around the permanent profiles the "transitory variance."

FINDINGS

In Table 2 we have estimated the model introduced above, separately for the original and recent cohorts. As a starting point, the fixed effects are given in Part I of the table. In order to illustrate the combined effect of the age three terms, Figure 4 shows the estimated average wage profile for each cohort. The "typical" profile for the recent cohort has a flatter slope that plateaus more slowly in the later ages. Note that the profiles for the two cohorts start off at very similar

[11] More complicated non-parametric specifications did not provide a better description of the curvature.

wage levels (the intercepts are not significantly different). It is the rate of wage growth that is lower for the recent cohort (the linear age terms are significantly different). Thus, the fixed-effects parameters are effectively recovering the stagnation in wage growth documented above.

These are the average wage trajectories for the two cohorts. How much do individual workers deviate from the average trajectories? Part II of the table gives the estimated permanent and transitory variances for each cohort. The permanent variance for the recent cohort is significantly higher than that for the original cohort. This indicates that the permanent, long-run wage profiles of young workers cohort have become significantly more unequal in recent years. By contrast, the transitory variances do not differ noticeably between the two cohorts, indicating that short-term, year-to-year wage fluctuation has not changed.

In order to pinpoint where this increased inequality in wage profiles is coming from, we list in Part III the estimated variances for each of the three random components. [12] The linear and quadratic random effects are considerably larger for the recent cohort and the differences are statistically significant – not so for the intercept random effect. Thus, the increased permanent variance for the recent cohort is being driven by increased variance in the shape of the profiles, with both steeper and flatter profiles relative to the original cohort.

To get a more intuitive feel for the relative contributions of the permanent and transitory components, we can plot the estimates of these components by cohort and age. In Figure 5, first note that for both cohorts, the permanent variances increase with age while the transitory variances decline with age. As we might expect, short-term wage fluctuations are substantial in the late teenage years and early 20s, but become much less important by the mid-30s. At that

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[12] We do not list the estimated covariances. Recall our parameterization of the model being fitted here: age is defined as 0 for 16 year olds, and all three terms are mutually orthogonal. Thus the difference in the estimated random effects can be interpreted as follows. For 16 years olds, the variance of the wage slopes has increased by 50% and the variance of the rate of change of the wage slopes has increased by 59%.

point, the permanent, long-run variability in wages takes precedence. The main message from these graphs is that starting around age 24, the recent cohort experiences progressively stronger growth in the permanent variance, and by the mid-30s the difference is quite pronounced. No such difference is evident in the transitory graph.

How have these two trends in mean and variance altered the structure of mobility? For an initial look at this question, we can predict a complete profile of permanent wage growth for each individual using the estimates from the model.[13] In Figure 6, we have clustered these profiles by cohort, using an hierarchical clustering technique with average linkage (Hartigan 1975). Each cluster is represented by a smoothed version of the profiles that fall within it, with the line width proportional to the cluster size. For the larger clusters, the percent of workers represented is identified next to the line. Comparing across the two panels clearly shows both the stagnation and greater inequality in wage profiles for the recent cohort. The comparison also suggests some evidence of growing market segmentation and the emergence of multiple mobility regimes. Increasingly, there are workers with high wage growth and steep profiles, and workers with low wage growth and flat profiles, while the central tendency that characterized the majority of profiles in the original cohort has become much weaker. The growing divergence of these trajectories is a strong and ultimately discouraging trend, especially because it is occurring during the key stages of career development.

Why has this occurred? Up to this point, we have not introduced any explanatory variables. Yet the literature on wage inequality has demonstrated, for example, the important role that rising returns to education have played, as well as deindustrialization and the decline of

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[13] Specifically, we use the Best Linear Unbiased Predictors (BLUPs) of the permanent wages. The predicted permanent wage for each individual at each age is a function of the common fixed effects and the individual-specific random effects.

unionization. Furthermore, as the field has only recently moved to the analysis of longitudinal datasets, fewer researchers have looked at the effects job changing or job loss (but see Stevens 1996b). Given our findings in Bernhardt, et al. (1998) of greater job instability in the recent cohort, however, the impact of the prevalence and returns to job changing clearly needs to be examined as well.

We have therefore taken the above "baseline" model and added a series of explanatory variables: experience, education level, tenure, industry, and hours worked. All are measured at the time of the wage observation and all are modeled as fixed effects. It is important to understand that we are interested in several features of this expanded "full" model. The fixed effects themselves are of interest, since they allow us to ask whether any of the explanatory covariates have become more or less important in recent years. For example, higher education may yield a greater "kick" for the recent cohort, and more strongly bump up the wage profile when a college degree has been attained. Working part-time, on the other hand, may yield a negative shock, adjusting the wage profile downward. We are also interested in the effects of these wage shocks on the permanent and transitory variances. For example, if education explains why the recent cohort's profiles have become more unequal, then controlling for education would have a greater impact on the permanent variance of the recent cohort, as compared to that of the original cohort, and by extension, decrease the difference between them.

With these two questions in mind, we turn to the results of the full model in Table 3 and begin with the fixed effects estimates. Starting with the age effects, we see that the stagnation in average wage growth for the recent cohort, while attenuated, remains significant after adding the new covariates. In general, all of the explanatory covariates are significant for both cohorts. The estimates for experience and experience squared show the familiar curvature, where wages

increase with accumulated work experience and slowly reach a plateau at high experience levels.[14] However, experience has become more important in recent years: the gains from work experience are significantly higher for the recent cohort. The returns to higher education have increased as well. Compared to a high school degree, the benefit of completing a four-year college degree has roughly doubled for the recent cohort, a strong finding that is in accordance with previous research – note again this reflects the loss in expected wages for the less educated rather than gains among the more educated. Predictably, those who have not completed high school fare worse than those who have, and some college experience yields few gains beyond a high school degree.[15]

Estimating the effect of tenure is more problematic. Very low tenures (of six months or less) effectively indicate new jobs and are capturing the returns to a job change. Longer tenures capture the returns to staying with one employer, and we know from previous work that these two returns differ dramatically by age (Bartel and Borjas 1981). We have therefore modeled a highly disaggregated version of tenure. For younger workers between the ages of 16 and 19, we see that there is effectively no advantage to staying with one employer as compared to changing employers. In fact, for the original cohort, engaging in early job search is beneficial to wage growth (the returns to tenures of more than a year and a half are significantly negative). This benefit is not nearly as strong for the recent cohort, a worrisome finding given the higher job instability these workers have experienced. For workers aged 20 and older, however, the returns to tenure begin to set in and are consistently higher than the returns to changing employers.

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[14] Experience is measured in months, and has age and age squared regressed out.

[15] Since this is current education level, the results for the 'some college' and 'less than high school' groups are likely confounded to some extent by current enrollment. The full-time/part-time variable is a very good but not complete proxy for current enrollment.

Among those with the longest tenures, the recent cohort shows stronger (though not significantly higher) returns as compared to the original cohort.

The effects of industry on wages generally point in the expected direction. As a general rule, employment in the goods-producing and public sectors yields higher wages than employment in the service sector. However, the recent cohort no longer benefits as much from employment in the traditionally unionized industries of manufacturing and transportation and communication (the parameter estimate is significantly lower than that for the original cohort). Finally, wages for full-time workers are significantly higher than those for part-time workers, but surprisingly, the difference has become less pronounced for the recent cohort.

What has been the combined impact of these covariates on the permanent and transitory variances? Part II of the table shows that the overall impact has been to reduce both variances. The recent cohort continues to have a higher permanent variance than the original cohort, although the difference has been noticeably dampened. A simple calculation indicates that the cohort difference has been cut roughly in half by the explanatory covariates. This is readily seen in Figure 7, where the permanent variances have grown closer across age. The cohort difference remains strong, however, in the mid-30 age range.[16]

In sum, our full model has been able to explain part of the greater inequality in wage profiles for the recent cohort, but not all of it. In order to ground these results in tangible terms, we have performed one final analysis. A concrete way to think about mobility is to consider the permanent wage gains that a young worker might expect to make between the ages of 16 and 34. Figure 8 superimposes the distribution of these permanent wage gains for the two cohorts. The stagnation in wage growth for the recent cohort is immediately evident. From the baseline

model, we estimate that the typical worker in the original cohort saw his hourly wage increase by $8.65 between the ages of 16 and 36, whereas the increase was only $6.69 for those in the recent cohort (both figures in 1992 dollars). In addition, the recent cohort had substantially more workers who experienced high wage growth and substantially more workers who experienced low and even negative wage growth. Thus we estimate that the percent of workers experiencing no wage growth or actual real wage declines was 1.7% for the original cohort but 7.2% for the recent cohort. Controlling for experience, education, tenure, industry, and hours worked in the second panel serves to dampen these striking differences but does not eliminate them.[17]

Recall that the bulk of life-time wage gains are made during the period that we have studied here: the first decade and a half of labor market experience. Thus we have observed most of the mobility that these young workers will experience during their career.

CONCLUSION

A new generation is entering a transformed labor market, and especially for those without a college degree, the prospects for a living wage and stable employment are not at all certain. In this paper, we have argued that a focus on worker mobility is key to furthering our understanding of these changes. Our comparison of two cohorts of young adults is meant as a first step in this direction. The findings from our analysis indicate that wage growth during the critical years of career development has been hit on two fronts: it has both stagnated and become significantly more unequal. To the extent that wage growth represents upward mobility, it is clear that the

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[16] Correspondingly, Part III of the table shows that the cohorts now differ only in the random effects variance for the age-squared term, which will make itself felt only in the higher age ranges.

[17] The predicted permanent wage gain from the full model is calculated for the modal worker, across the two cohorts.

prospects for such mobility have deteriorated in recent years. Those without a four-year college degree were hit the hardest, and they represent the majority of workers. But workers higher up the skill and education ladder have also experienced growing inequality within their ranks. Increased shifting between jobs and declining returns to job search have played a role, as have deindustrialization and the emergence of the service economy – although even traditionally unionized industries no longer provide the same degree of solid wage growth that they once did.

These findings suggest that there has been a fundamental shift in the American employment relationship, that the rules of work and career mobility have changed. Clearly, more research is needed to move beyond the level of suggestion. But the key is to recognize that mobility forms the connective tissue between firm restructuring on the one hand and wage outcomes for workers on the other. If the connection between these two processes is to be understood, then current research must be refocused. We need to examine the strategies that firms have adopted in the search for competitiveness, and ask how they have affected the structures that govern mobility. Both internal and external to firms, these structures include wage determination and labor allocation, job design, the nexus of screening, hiring, and training, and the dependence of future paths on those already taken (Doeringer and Piore 1971; Baron and Bielby 1980).

Cross-sectional research and the atomistic conceptual framework which usually attends it cannot be used for this purpose (Granovetter 1981). There must be a revival of the basic tenet of the sociology of stratification and inequality: that the systematic paths by which workers move through the labor market over time are structural features of that market and define the distribution of opportunity (Spilerman 1977). There must also be a return to the long-standing argument of institutional economics: firm strategies are choices made within a network of

constraints, which derive not just from product markets but also institutions and regulations, as well as past choices made by the firm (Kerr 1954; Dunlop 1964). The insights from these two intellectual traditions are required in order to sort through the competing intuitions about what the future American labor market will look like. Ultimately, it is a question of whether we are seeing the emergence of a more fluid and equitable labor market or a more segmented labor market, where mobility from entry-level to good career jobs is declining and where some groups of workers are increasingly cut off from lifetime movement into the core. The growing polarization in upward mobility that we have documented in this paper indicates that the latter is a distinct possibility.

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Table 1. Characteristics of sample for wage profile analysis

	Cohort	
	Original	Recent
Total Number of Person-Years	18,573	25,830
Mean Number of Observations Per Case	8.6	12.4
Maximum Possible Observations Per Case	12	16
Mean Real Hourly Wage (1992 $)	12.39	11.21
Mean Age	25.5	26.1
Educational Distribution:		
High school drop-out	17.9%	15.3%
High school graduate	34.4%	43.7%
Some college	24.3%	20.4%
College graduate or higher	23.3%	20.5%
Work experience (mean of residuals, see text)	0.00	0.00
Work experience squared (mean of residuals, see text)	0.00	0.00
Percent working part-time	15.5%	14.7%
Age-specific Tenure		
Tenure of 0-6 months (16-19 year olds)	9.1%	5.2%
Tenure of 7-18 months (16-19 year olds)	3.3%	3.3%
Tenure of 19-36 months (16-19 year olds)	1.1%	1.4%
Tenure of more than 36 months (16-19 year olds)	0.7%	0.4%
Tenure of 0-6 months (20-37 year olds)	22.7%	20.2%
Tenure of 7-18 months (20-37 year olds)	17.2%	20.6%
Tenure of 19-36 months (20-37 year olds)	15.3%	17.3%
Tenure of more than 36 months (20-37 year olds)	30.6%	31.6%
Industry		
Construction, mining, agriculture	13.6%	15.0%
Manufacturing, transport. & communication	37.1%	31.2%
Wholesale & retail trade, business services	26.6%	35.4%
FIRE & professional services	16.7%	14.2%
Public administration	6.0%	4.2%

Table 2. Results from baseline mixed-effects model

I. Fixed Effects

	Original Cohort	Recent Cohort	Significance of difference between cohorts
Intercept	1.6058	1.6257	
Age	0.0730	0.0579	**
Age squared	-0.0037	-0.0024	**

II. Permanent and Transitory Variances

	Original Cohort	Recent Cohort	Significance of difference between cohorts
Permanent variance	0.1137	0.1509	**
Transitory variance	0.0783	0.0786	
Total variance	0.1920	0.2295	**

III. Random Components Variances

	Original Cohort	Recent Cohort	Significance of difference between cohorts
Intercept	0.116201	0.131570	
Age	0.001425	0.002139	**
Age squared	0.000012	0.000019	**

** Cohort estimates are significantly different at .01 level
Age is rescaled to age-16, age squared has age regressed out.
Experience has age and age squared regressed out.
Experience squared has age, age squared, and experience regressed out.

Table 3. Results from full mixed-effects model

I. Fixed Effects

	Original Cohort	Recent Cohort	Significance of difference between cohorts
Intercept	1.7322	1.7334	
Age	0.0502	0.0359	**
Age squared	-0.0021	-0.0011	**
Experience	0.0019	0.0040	**
Experience squared	-0.0000	-0.0000	
Current education (High school graduate)			
Less than high school	-0.0999	-0.0574	
Some College	-0.0083 †	0.0052 †	
College degree or more	0.1565	0.2994	**
Age-specific Tenure			
16-29			
Tenure of 7-18 months	0.0234 †	0.0098 †	
Tenure of 19-36 months	-0.0018 †	0.0053 †	
Tenure of more than 36 months	-0.0829	-0.0743	
20-37			
Tenure of 0-6 months	0.0140 †	-0.0055 †	
Tenure of 7-18 months	0.0587	0.0338	
Tenure of 19-36 months	0.0735	0.0751	
Tenure of more than 36 months	0.0836	0.0998	
Industry (wholesale & retail trade, business services)			
Construction, mining, agriculture	0.1126	0.1379	
Manufacturing, transport. & communication	0.1542	0.1203	*
FIRE & professional services	0.0076 †	0.0294	
Public administration	0.1049	0.0783	
Part-time worker	-0.1116	-0.0688	**

Continued on next page...

* Cohort estimates are significantly different at .05 level
** Cohort estimates are significantly different at .01 level
† Parameter estimate is not significant at .05 level

Age is rescaled to age-16, age squared has age regressed out.
Experience has age and age squared regressed out.
Experience squared has age, age squared, and experience regressed out.

Table 3 (continued)

II. Permanent and Transitory Variances

	Original Cohort	Recent Cohort	Significance of difference between cohorts
Permanent variance	0.0956	0.1107	*
Transitory variance	0.0735	0.0754	
Total variance	0.1691	0.1861	**

III. Random Components Variances

	Original Cohort	Recent Cohort	Significance of difference between cohorts
Intercept	0.101014	0.088806	
Age	0.001199	0.001409	
Age squared	0.000010	0.000015	**

* Cohort estimates are significantly different at .05 level
** Cohort estimates are significantly different at .01 level

Age is rescaled to age-16, age squared has age regressed out.
Experience has age and age squared regressed out.
Experience squared has age, age squared, and experience regressed out.

Figure 1

Mean of log wages, by age
Mean
3.0
2.5
2.0
1.5
Original
Recent
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37
Age

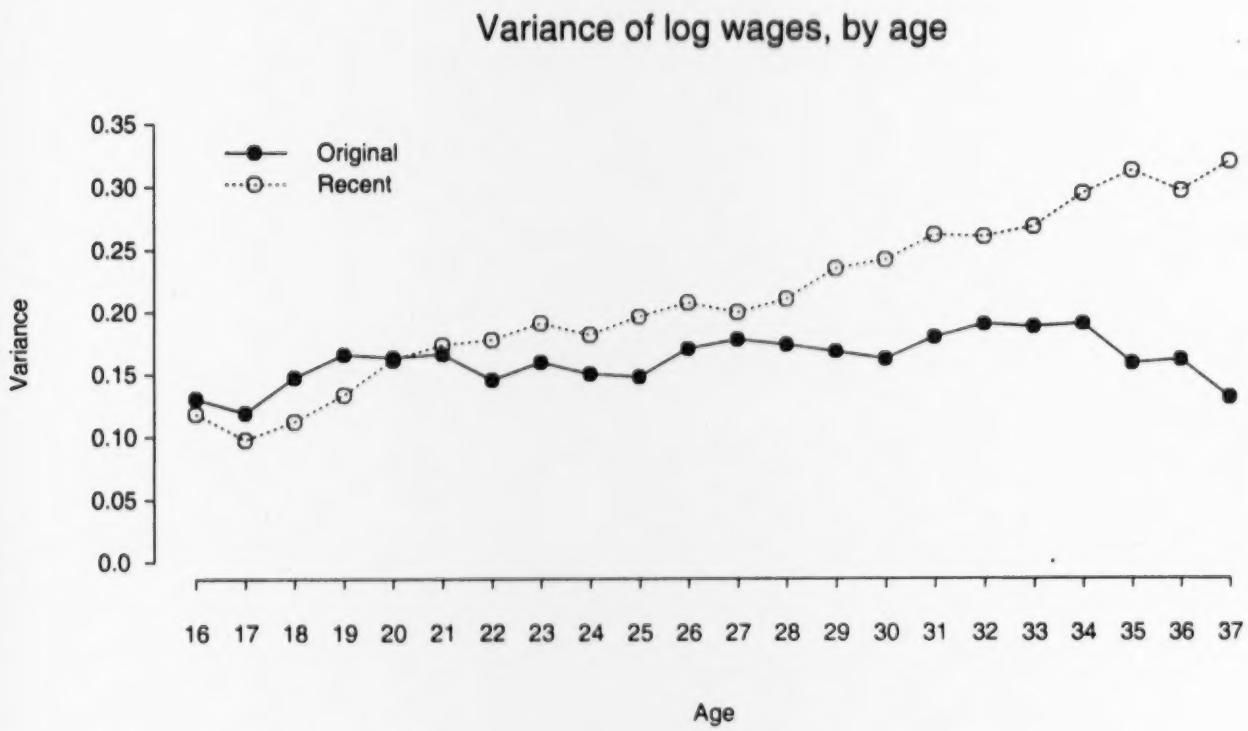

Variance of log wages, by age
Variance
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.0
Original
Recent
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37
Age

Figure 2. Relative distribution of older workers' to younger workers' log wages
(median adjusted)

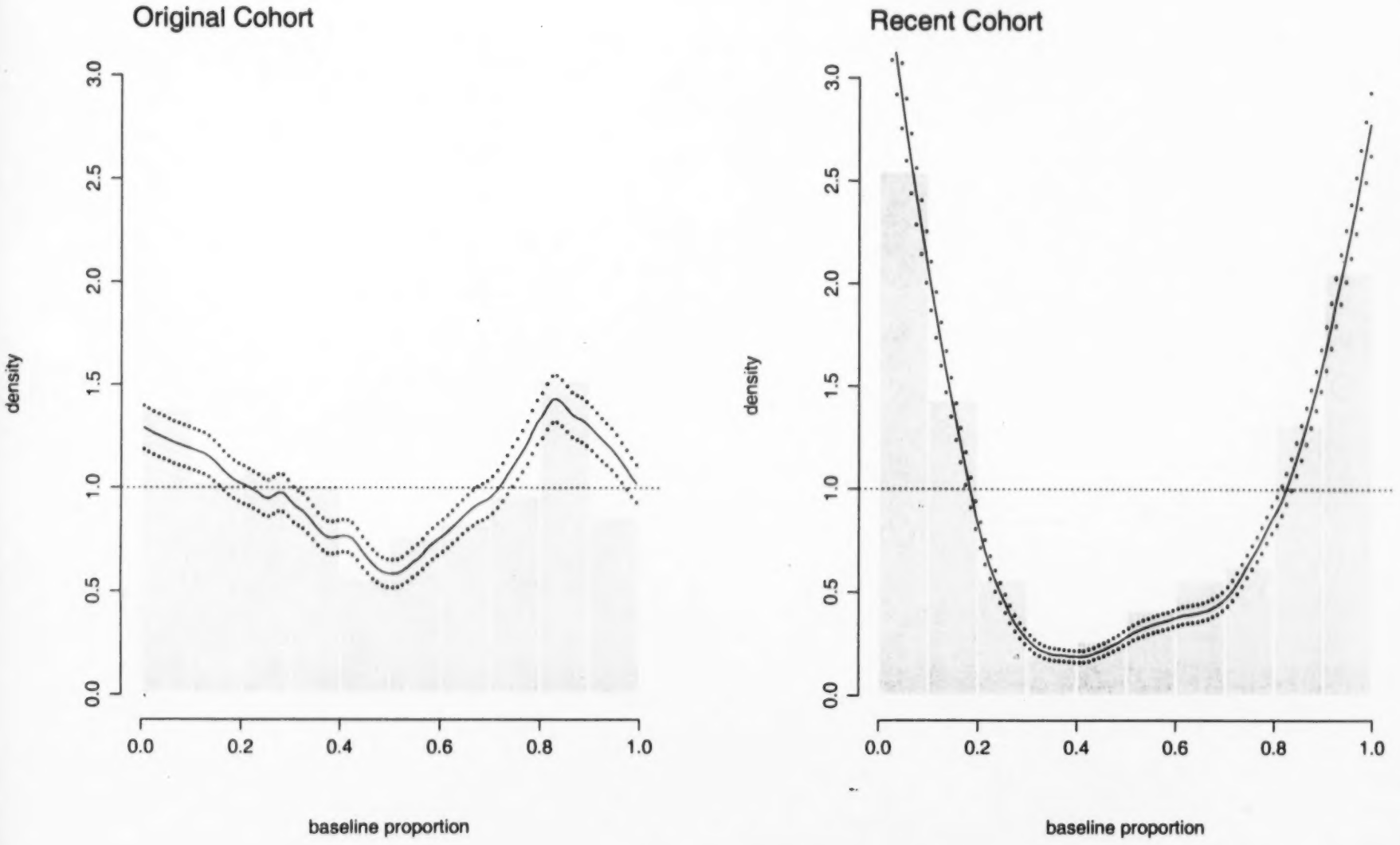


Figure 3. An intuitive explanation of the mixed-effects model

A. The average profile of wage growth

B. The deviation of individual profiles from the average profile

C. The remaining short-term fluctuation in wages

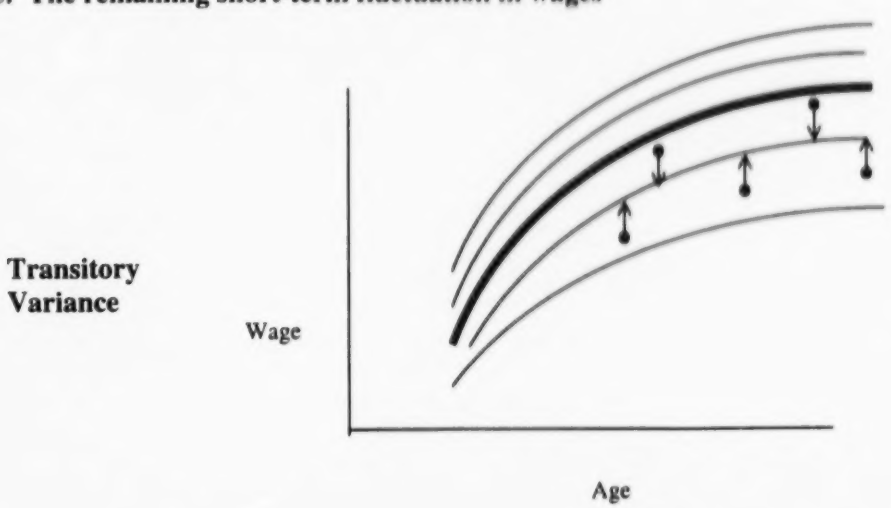
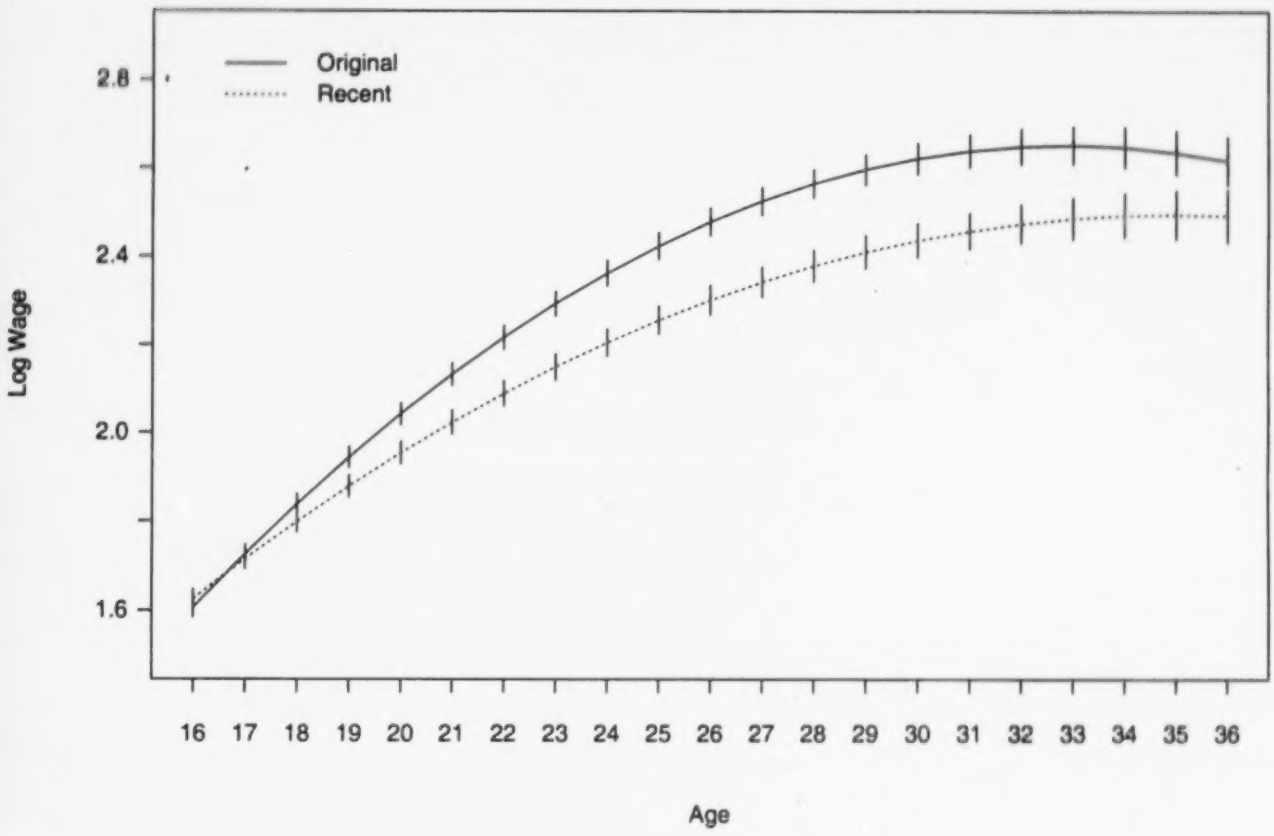
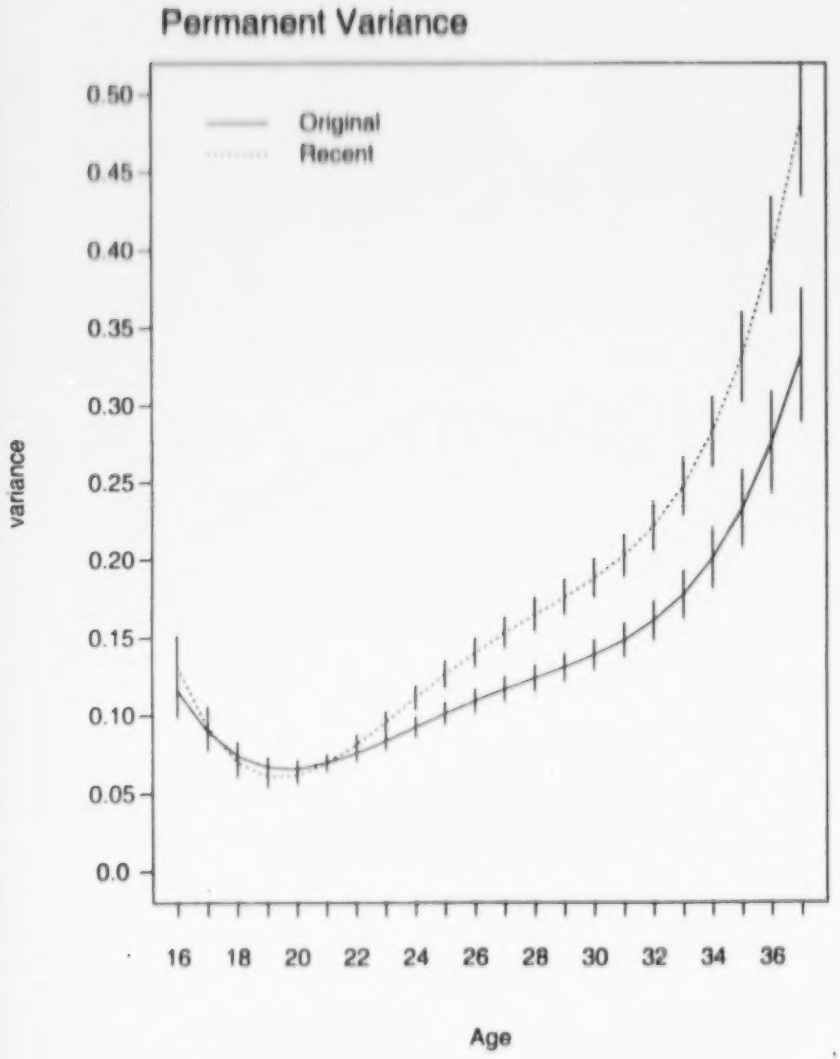


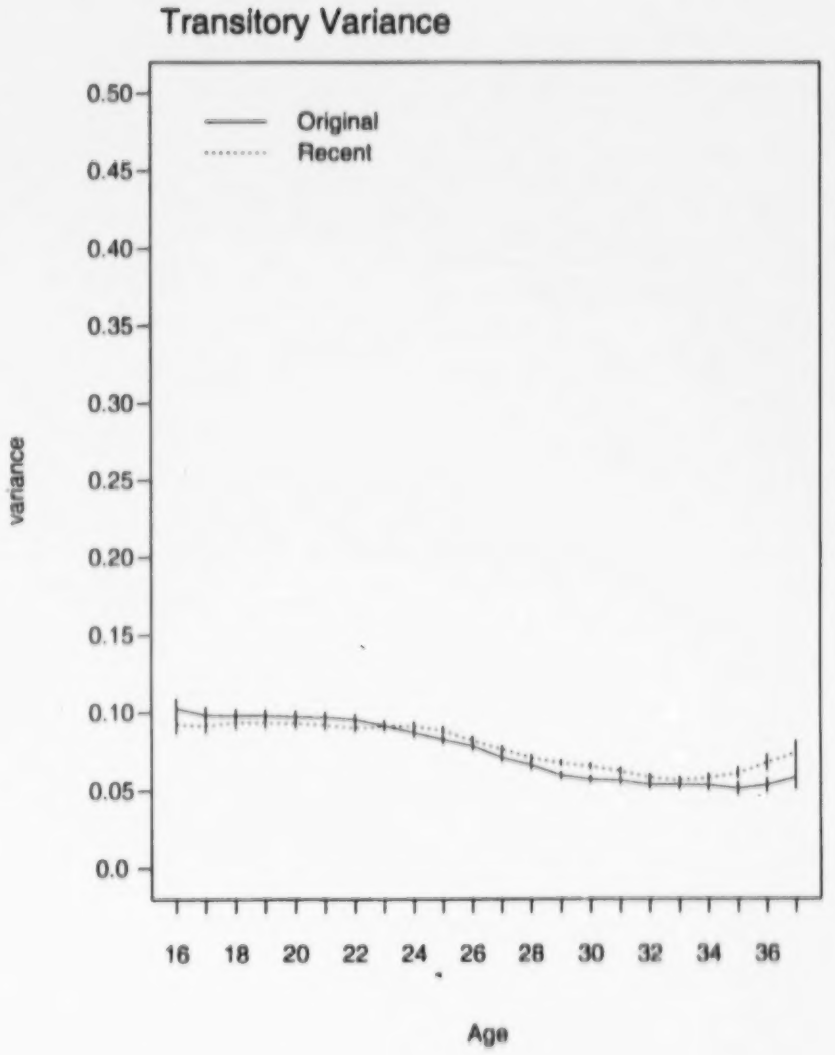
Figure 4. Fixed effects wage profile



(vertical lines are 95% confidence intervals)

Figure 5. Permanent and transitory variances from baseline model





(vertical lines are 95% confidence intervals)

Figure 6. Clustered permanent wage profiles

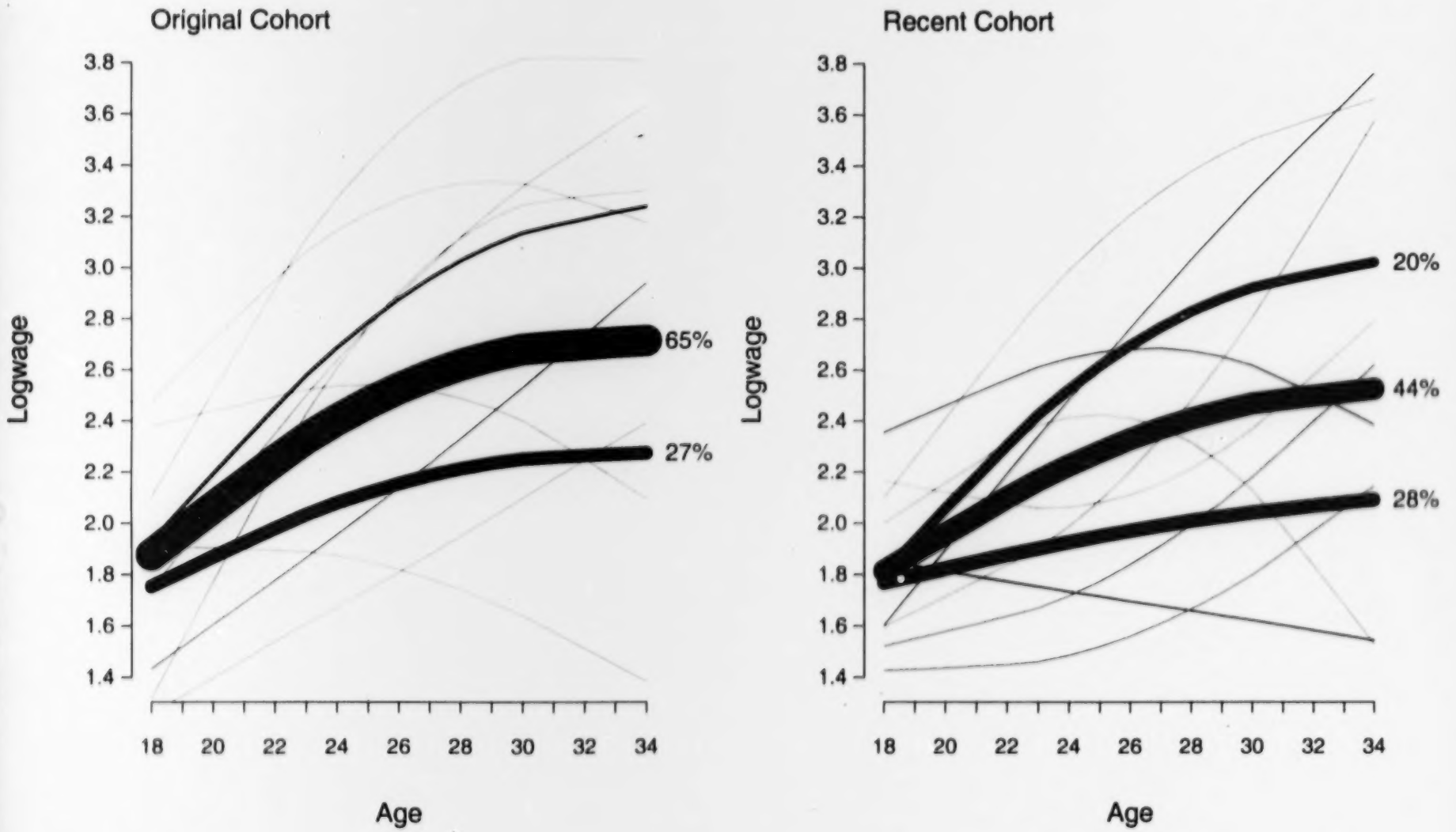
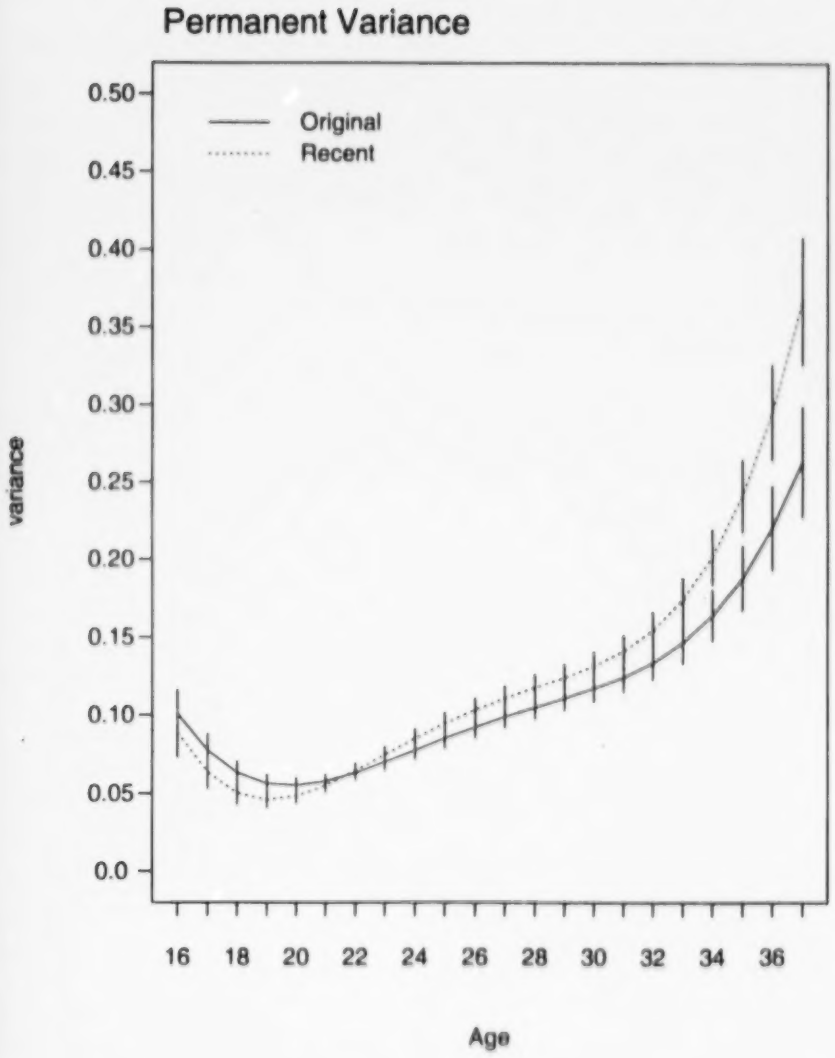
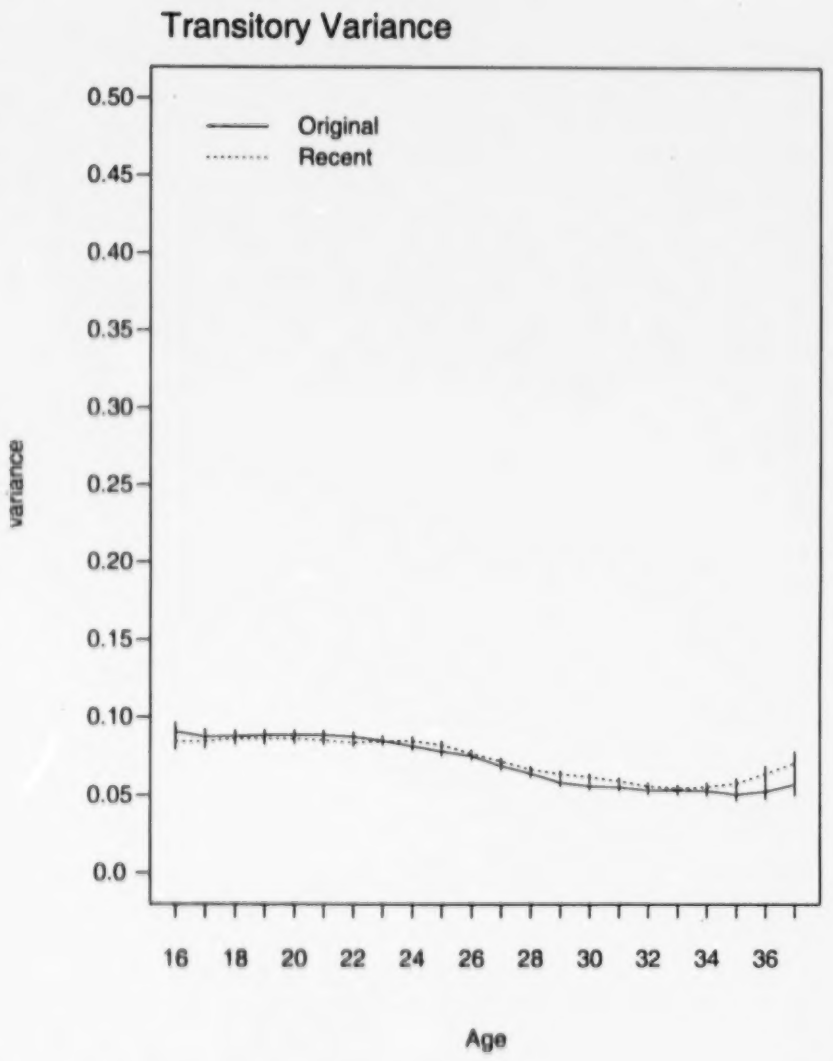


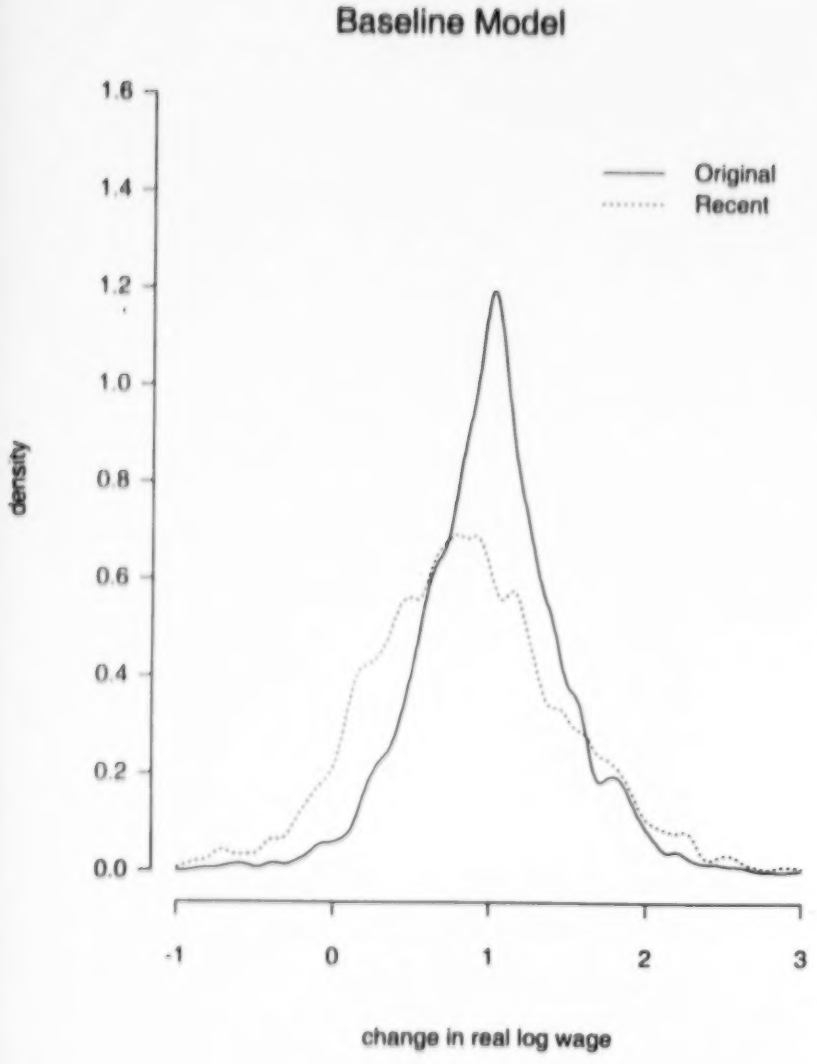
Figure 7. Permanent and transitory variances from full model

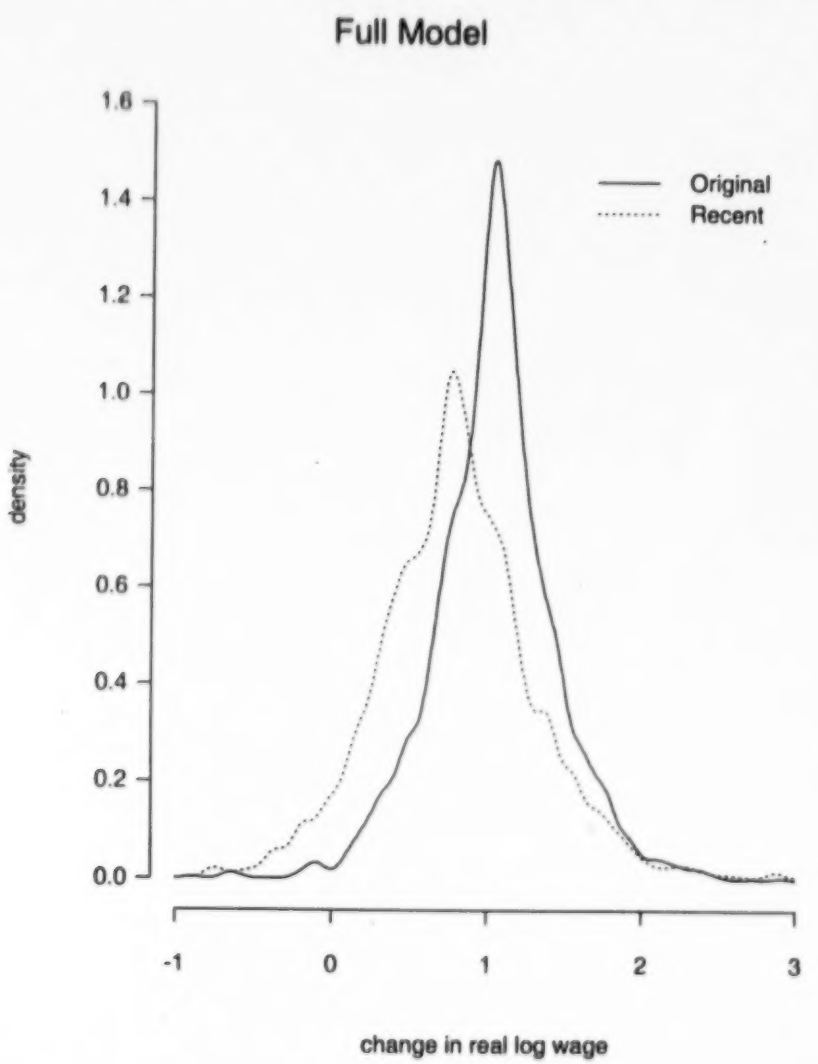




(vertical lines are 95% confidence intervals)

Figure 8. Predicted change in real log wage from age 16 to 36





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